Cite No.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :		(11) International Publication Number: WO 00/02384
H04N 5/44	A2	(43) International Publication Date: 13 January 2000 (13.01.00)

(21) International Application Number: PCT/IB99/01149

(22) International Filing Date: 21 June 1999 (21.06.99)

(30) Priority Data:
98202260.0 6 July 1998 (06.07.98) EP

(71) Applicant: KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL–5621 BA Eindhoven (NL).

(71) Applicant *(for SE only)*: PHILIPS AB [SE/SE]; Kottbygatan 7, Kista, S–164 85 Stockholm (SE).

(72) Inventor: DE MEERSMAN, Erik; Prof. Holstlaan 6, NL–5656 AA Eindhoven (NL).

(74) Agent: STEENBEEK, Leonardus, J.; Prof. Holstlaan 6, NL–5656 AA Eindhoven (NL).

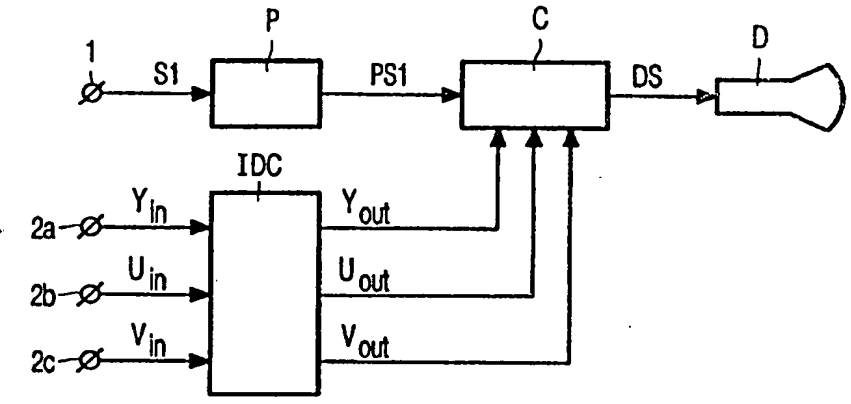
(81) Designated States: JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: IMAGE DATA COMPRESSION

(57) Abstract

In an image data compression method, digitized luminance (Yin) and chrominance (Uin, Vin) signal samples in a ratio yin:uin:vin are subsampled (IDC) to obtain subsampled luminance (Yout) and chrominance (Uout, Vout) signal samples in a ratio yout:uout:vout, wherein yin:yout exceeds uin:uout and/or yin:yout exceeds vin:vout.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

Image data compression.

The invention relates to an image data compression such as used for Picture-In-Picture (PIP) or double-window TV.

Luminance (Y) and chrominance (U, V) are commonly sampled (digitized) in a ratio Y:U:V = 4:1:1. In NTSC countries, where the signals I and Q are used instead of U and V, this would be Y:I:Q = 4:1:1. In PIP or double window applications, this ratio is commonly preserved at the downsampling operation to obtain the smaller image.

It is, inter alia, an object of the invention to obtain a better color resolution after subsampling. To this end, a first aspect of the invention provides a method and a device as defined by claims 1 and 2. A second aspect of the invention provides an image display apparatus device as defined by claim 3.

In an image data compression method in accordance with a primary aspect of this invention, digitized luminance and chrominance signal samples in a ratio yin:uin:vin are subsampled to obtain subsampled luminance and chrominance signal samples in a ratio yout:uout:vout, wherein yin:yout exceeds uin:uout and/or yin:yout exceeds vin:vout.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

The drawing shows an embodiment of an image display apparatus in accordance with the present invention.

The embodiment shown in the drawing comprises an image data compression device, comprising inputs 2a, 2b, 2c for receiving digitized luminance signal samples Yin and chrominance signal samples Uin, Vin in a ratio yin:uin:vin. As mentioned above, a common ratio would be yin:uin:vin = 4:1:1. Alternatively, yin:uin:vin = 4:2:2. The embodiment further comprises an image data compression device IDC for subsampling the digitized luminance Yin and chrominance Uin, Vin signal samples to obtain subsampled luminance signal samples Yout and chrominance signal samples Uout, Vout in a ratio yout:uout:vout. In accordance with

the present invention, yin:yout exceeds uin:uout and/or yin:yout exceeds vin:vout. So, where in the prior art a 4:1:1 sampled signal would stay a 4:1:1 ($=1:\frac{1}{4}:\frac{1}{4}$) sampled signal upon subsampling, in accordance with the present invention, a 4:1:1 sampled signal becomes a 4:2:2 ($=1:\frac{1}{2}:\frac{1}{2}$) or even a 4:4:4 (=1:1:1) sampled signal. Thereby, the color resolution is enhanced with regard to the luminance resolution just by throwing away less chrominance samples that what would be proportionate to the reduction in luminance samples. In one example, no chrominance samples whatsoever are thrown away.

The embodiment further comprises a device P for processing a first signal S1 applied to an input 1 to obtain a processed first signal PS1. In a PIP application, the device P would be formed by the main signal channel, while in a double window application, the device P would be similar to the image data compression device IDC. The first signal S1 may be a composite video signal, or a set of luminance and chrominance signals just as present at the inputs 2a, 2b and 2c. A combination device C combines the processed first signal PS1 and the compressed signals Yout, Uout, Vout to obtain a display signal DS. A display device D displays the display signal DS.

It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. Especially, where the embodiments mention U and V signals, I and Q signals may be used in an NTSC environment. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The word "comprising" does not exclude the presence of other elements or steps than those listed in a claim. The invention can be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer. In the device claim enumerating several means, several of these means can be embodied by one and the same item of hardware.

CLAIMS:

1. An image data compression method, comprising:

receiving (2a, 2b, 2c) digitized luminance (Yin) and chrominance (Uin, Vin) signal samples in a ratio yin:uin:vin; and

subsampling (IDC) said digitized luminance (Yin) and chrominance (Uin, Vin) signal samples to obtain subsampled luminance (Yout) and chrominance (Uout, Vout) signal samples in a ratio yout:uout:vout, wherein yin:yout exceeds uin:uout and/or yin:yout exceeds vin:vout.

2. An image data compression device, comprising:

means for receiving (2a, 2b, 2c) digitized luminance (Yin) and chrominance (Uin, Vin) signal samples in a ratio yin:uin:vin; and

means for subsampling (IDC) said digitized luminance (Yin) and chrominance (Uin, Vin) signal samples to obtain subsampled luminance (Yout) and chrominance (Uout, Vout) signal samples in a ratio yout:uout:vout, wherein yin:yout exceeds uin:uout and/or yin:yout exceeds vin:vout.

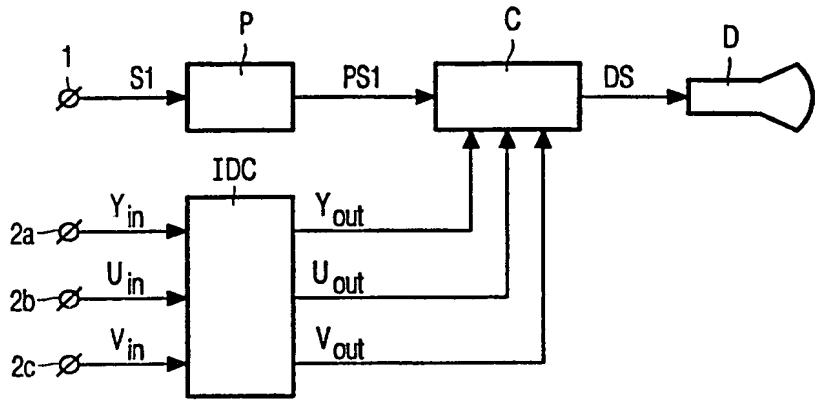
3. An image display apparatus, comprising:

means for processing (P) a first signal (S1) to obtain a processed first signal (PS1);

an image data compression device (IDC) as claimed in claim 2 for compressing a second signal including digitized luminance (Yin) and chrominance (Uin, Vin) signal samples to obtain a compressed second signal including subsampled luminance (Yout) and chrominance (Uout, Vout) signal samples;

means for combining (C) said processed first signal (PS1) and said compressed second signal (Yout, Uout, Vout) to obtain a display signal (DS); and

means for displaying (D) said display signal (DS).


1
S1
P
PS1
C
DS
D
IDC
2a
Y_{in}
2b
U_{in}
2c
V_{in}
Y_{out}
U_{out}
V_{out}